



**UNITED STATES DEPARTMENT OF COMMERCE**  
**United States Patent and Trademark Office**

Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

*colh*

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. |
|-----------------|-------------|----------------------|---------------------|
|-----------------|-------------|----------------------|---------------------|

09/628,158    07/28/00    CHAUDHARI

R    5728

|          |
|----------|
| EXAMINER |
|----------|

HM12/0521

ARLENE J. POWERS  
SAMUELS GAUTHIER & STEVENS LLP  
225 FRANKLIN STREET SUITE 3300  
BOSTON MA 02110

|           |              |
|-----------|--------------|
| CALVE, J. |              |
| ART UNIT  | PAPER NUMBER |

1623  
DATE MAILED:

*7*  
05/21/01

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trad marks**

# Office Action Summary

Application No.

09/628,158

Applicant(s)

CHAUDHARI ET AL.

Examiner

John N. Calve

Art Unit

1623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) \_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3
- 18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

## DETAILED ACTION

### *Double Patenting*

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-19 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-17 of copending Application Number 09/662035. Although the conflicting claims are not identical, they are not patentably distinct from each other because both applications contain claims drawn to a process for preparing 2-aryl propionic acid. The method set forth in the instant application is seen to encompass the steps comprising the method set forth in (035'). Both applications are drawn to processes wherein the final outcome results in preparation of 2-aryl propionic acid by carbonylating an aryl compound using essentially the same catalyst, promoter, organic acid. There are slight variations in the amounts of catalysts, promoters and acids used to prepare the final product. It would have been obvious to one skilled in the art at the time the invention was made to

Art Unit: 1623

evaluate the detailed process steps of (035') and conclude that the claimed process or reaction steps of the instant application are prima facie obvious. The specific steps of (035') application encompass the broader process claims in the instant application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not been patented.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

Art Unit: 1623

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1 - 19 are rejected under 35 U.S.C. 103 for being unpatentable over Chaudhari et al (U.S. 6,093,847) in view of Lin et al (U.S. 5,055,611). Applicant's claims are drawn to the preparation of 2-aryl propionic acids such as ibuprofen by

- carbonylating an arylalkyl halide, aryl alcohol or aryl olefin
- using a halide promoter such as lithium chloride or lithium bromide
- an organic acid such as p-toluene sulfonic acid
- a homogeneous palladium catalyst such as palladium chloride
- an organic solvent such as methyl ethyl ketone
- water
- and the following temperature (30 – 130° C), time (0.3 to 4 hours) and pressure (50-1500 psig).

Chaudhari (847') teaches the process for the preparation of ibuprofen by reacting an aryl alcohol under the same conditions as taught by applicant. Chaudhari teaches the carbonylation of an aryl alcohol, with a halide promoter, organic acid, water, homogeneous palladium catalyst in an organic solvent, under the same conditions (time, temperature and pressure), see abstract, column 2, lines 1-31 and 61-65. Steps ii, iii, iv, and v of claim 1 are disclosed in Chaudhari, example 1. However, Chaudhari uses a catalyst with a semilabile anionic chelating ligand which is not used by applicant. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the catalyst in Chaudhari to eliminate the chelating

Art Unit: 1623

ligand. One having ordinary skill in the art would have been motivated to do this because the process and cost of making the catalyst is reduced. Another difference, between Chaudhari and applicant is that Chaudhari does not disclose the carbonylation reaction using alkylaryl halides or aryl olefins. However, Lin discloses a process for preparing ibuprofen by carbonylating an alkylaryl halide, aryl olefin and an aryl alcohol using a palladium chloride catalyst, water, methyl ethyl ketone, see abstract and example 1. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Lin so that it is used with the process developed by Chaudhari. One having ordinary skill in the art would have been motivated to do this because Chaudhari's process offers higher reaction rates and higher selectivity, under milder conditions (pressure), than Lin. Moreover, expanding the possible starting materials used by Chaudhari to include alkylaryl halides and aryl olefins would be a further benefit allowing for greater flexibility in the synthesis of ibuprofen. Finally, one would be motivated to combine Lin and Chaudhari because ibuprofen is a commercially successful product and therefore using the more efficient process of Chaudhari allows for cheaper production of ibuprofen and greater profit.

Claims 2-7 are rejected because they are drawn to the type of palladium catalyst, halide promoter and organic acid used in the Chaudhari carbonylation reaction, see column 2, lines 47-54 and 55-60.

The ratio of reactants as in claims 8-19 which are drawn to the ratio of reactants in the carbonylation reaction are disclosed by Chaudhari, see column 2, lines 66-67, column 3, lines 1-11, and examples 3-7.

The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Isshiki et al (U.S. 4,212,989) discloses a process for producing a carboxylic acid by carbonylating an alcohol using a Group VIII catalyst.

Varadaraj (EP 0,338,852) discloses a method for the preparation of alpha-arylpropionic acids such as ibuprofen by carbonylating the corresponding 1-arylethyl halide in an acidic aqueous medium containing a palladium catalyst.

Lin et al (5,055,611) discloses a process for preparing ibuprofen. The improved process involves the treatment of spent palladium carbonylation catalyst with oxygen. The treated material then used with a phosphine ligand to carbonylate 1-halo-(4-isobutylphenyl) ethane, 1-hydroxyl-1-(4-isobutylphenyl)ethane or isobutylstyrene to produce ibuprofen.

DeVries (U.S. 4,582,929) discloses a process for the carbonylation of an organic halide to prepare a carbonyl-containing compound. The catalyst disclosed by Devries is seven metals from Group VIII which are employed homogeneously or heterogeneously.

Makin et al (U.S. 4, 255, 591) discloses the production of carboxylic acids and esters by carbonylating olefins, alcohols, ethers and halides using a homogeneous catalyst.

Singelton (U.S. 4,733,006) discloses an improved process where an olefin, alcohol, ester, halide or ether are carbonylated in liquid phase using a rhodium catalyst and a halide.

Tanaka et al (U.S. 4,937,362) discloses a process for the production of ibuprofen by reacting an aromatic alcohol with a group VIII catalyst. The catalyst is combined with a phosphine compound and an iodine or bromine compound.

Drent et al (U.S. 5,158,921) discloses a catalyst for a carbonylation process which comprises a group VIII metal and a phosphine. Also disclosed is the use of the catalyst system in the selective carbonylation of unsaturated hydrocarbons.

Fenton (U.S. 3,700,729) discloses the process for the preparation of aromatic carboxylic acids using the halide salt of a group VIII metal in its highest valence.

Tanaka et al (U.S. 4,843,172) discloses a process for the preparation of ibuprofen by the carbonylation of an alcohol using group VIII catalysts such as rhodium halides, rhodium carbonyls and rhodium acetate along with an iodine co-catalyst.

Alper et al (U.S. 4,681,707) discloses a process for the preparation of carboxylic acids by reacting an olefin with carbon monoxide in the presence of a protonic acid and a group VIII catalyst. The group VIII catalysts used are palladium, rhodium, ruthenium, iridium, and cobalt.

Singleton et al (U.S. 4,433,166) discloses a process for carbonylation of an olefin, alcohol or halide into a carboxylic acid using a rhodium catalyst. The catalyst is stabilized in soluble form and any catalyst that precipitates is reconverted into a soluble form.

Cassar et al (U.S. 4,034,004) discloses a process for preparing carboxylic acids by reacting carbon monoxide with aromatic and aliphatic organic halides with a phosphinic palladium complex.



Smith et al (U.S. 5,237,097) discloses the carbonylation of an olefin, or alcohol in the presence of a group VIII catalyst. The liquid carbonylation product solution of the reaction is conveyed to a separation zone maintained at a lower total pressure than the reaction zone. A portion of the liquid carbonylation product solution is flashed and removed from the separation zone. The unflashed liquid carbonylation product solution is recycled back into the reaction.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Calve. The examiner can normally be reached on Monday-Friday between the hours of 9:30 a.m. and 6:00 p.m at (703)-605-1201.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Geist, SPE of Art Unit 1623, may be reached at (703) 308-1701. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-4556.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1235.

For 24 hour access to patent application information 7 days a week, or for filing applications electronically, please visit our website at [www.uspto.gov](http://www.uspto.gov) and click on the button "Patent Electronic Business Center" for more information.



GARY GEIST  
SUPERVISORY PATENT EXAMINER  
TECH CENTER 1600